

# SCIENCE & EDUCATION Impact

Benefits from USDA/Land-Grant Partnership

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## High Tech Agriculture

The future of farming.

*Combine the biotechnology revolution with the information explosion, and agriculture takes on a whole new look. Today's Renaissance farmer is a scientist, a financial strategist, a human resources supervisor and a plant manager. There's a lot more to farming than planting and harvesting and the U.S. Department of Agriculture (USDA) and Land-Grant universities are right in the middle of it.*

### Payoff

- **Three-in-one.** A breakthrough vaccine developed by **Minnesota** scientists saves producers \$200 million a year and protects baby chicks against three major diseases at the same time. The automated process, which injects the three-in-one vaccine directly into eggs, replaces an older treatment that prevented only one disease.
- **Green gene.** A gene from pond algae will help wheat plants grow quicker and stronger on less fertilizer. **Florida** scientists isolated a gene in green algae that, when transferred to wheat, helps the plant use nitrate fertilizer more efficiently. And when the nitrate is changed to ammonium, the wheat grows 40 percent faster. A private company that hopes to produce crops that use two-thirds less fertilizer has licensed the technology.
- **Good bull.** A color-based diagnostic test developed by **Arizona** scientists detects the presence of a protein that predicts bull fertility. The bull with the right stuff can increase fertility by 17 percent. In tests on **Texas'** King Ranch, high-fertility bulls led to 83 percent early-born calves, a direct measure of profitability. A 1 percent increase in bull fertility would net U.S. beef producers \$55 million.
- **No dud spuds.** Applying soluble calcium to potatoes between July and September markedly reduces tuber defects and losses to soft rot in storage, according to a **Wisconsin** horticulturist. The additional calcium also prevents yield reductions in hot weather. The improvement in potato quality nets growers

RESEARCH,  
EXTENSION AND  
EDUCATION  
AT WORK

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about \$100 per acre. More than half the state has adopted the practice in the last years, improving value of their crop by \$3.5 million.

- **Starch standard.** An infrared transmittance sensor developed by **Illinois** scientists can be used to accurately gauge the amount of extractable starch in corn. A 1 percent increase in the amount of accessible starch adds 4 cents to 6 cents to a bushel of corn, a premium that can go straight to the farmer's pocket. The wet milling industry also benefits from higher starch yields.
- **Farm finances.** To help farmers manage money more effectively, **Minnesota** agricultural economists have created FINPACK, a computer-based financial planning and analysis tool that has become the most widely used program of its kind in the world. In Minnesota alone, FINPACK saves each producer about \$4,000 per year. Statewide, it saves \$32 million.
- **Resisting resistance.** Insects have a way of eventually overcoming almost every technology developed to control them. **Louisiana State** is extending the useful life of some valuable crop protection chemicals through insecticide-resistance management that helps slow the growth of resistant insect populations. Developed for Louisiana's \$500 million cotton crop, the program has been put in place in **Arkansas, Mississippi, Missouri** and **Tennessee**.
- **Homegrown canola.** While Canada supplies most of the United States demand for heart-healthy canola oil, **Georgia** researchers have demonstrated the crop can be grown down home. An emerging industry, the Georgia canola crop earns \$5 million annually and is projected to grow to \$50 million by 2000. The potential for other Southern states is even greater.
- **Gene scheme.** A new method of inserting genes into plants takes the desired traits straight to the growing tip of almost any plant. **Texas A&M** researchers are using the patented method to create insect- and disease-resistant cotton, termite-resistant wood and disease-resistant rice.

- **Bigger calves.** Using DNA markers, researchers at **South Dakota State** have found the gene combination that regulates beef milk production, which significantly affects calf-weaning weight. They estimate the extra efficiency could increase weaning weights by as much as 20 pounds per calf, adding another \$15 to the value of each animal.
- **Classifying cotton.** Cotton plants have more than 50,000 genes, but scientists believe that as few as 50 are the key players in determining fiber yield and quality. **Texas A&M** scientists hope to make U.S. cotton even more competitive by genetically engineering plants to eliminate gossypol (a toxic substance in cottonseed that limits its use as a feed), improve fiber quality and inhibit root rot. To date, they've mapped all the genes responsible for those traits and are in the process of transferring a fiber strength gene to the best varieties.
- **Quality cattle.** Food safety and quality concerns have led **Virginia** cattle buyers to pay premiums for feeder cattle with known health and genetic backgrounds certified by a third party. **Virginia** Extension staff has helped teach quality assurance to 800 beef cattle producers. The 2,000 cattle marketed through the program earned an average price premium of \$4.34 per hundredweight or \$54,000 more than common cattle.
- **Light show.** Lettuce growers in **Alaska** struggle with unique production problems such as midnight sun. **Alaska** researchers working in irrigation and improved varieties have boosted per acre lettuce production to \$4,420, a 50 percent increase over the last 12 years.



**Cooperative State Research, Education,  
and Extension Service**  
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Cooperative State Research, Education, and Extension Service in cooperation with the Extension Committee on Organization and Policy, the Experiment Station Committee on Organization and Policy, the Academic Programs Committee on Organization and Policy, the International Programs Committee on Organization and Policy, and the Louisiana State University Agricultural Center.

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